Amendments to the Claims

1. (currently amended) A method for forming a substantially spherical free air ball on a fine non-oxidizable wire in a computerized bonder having an electronic flame-off (EFO) apparatus operable to generate pulses of different heights and widths, comprising the steps of:

positioning a free end of said wire opposite to an EFO electrode, spaced apart by a gap;

applying a train of EFO current pulses between said electrode and said wire;

controlling said pulse heights to melt a pre-determined volume of said wire ~~while minimizing the heat-affected zone of said wire and the wire necking, thereby creating free air balls of small diameters and high ball/wire strength~~;

controlling said pulse widths to create a substantially spherical ball shape; and

automatically calculating the ~~minimum~~ train of consecutive EFO current pulses of various heights and widths~~, thereby minimizing the time needed for creating one bond and maximizing the number of bonds provided per second~~ to produce the desired ball characteristics in a predetermined amount of time.

2. (original) The method according to Claim 1 wherein said train of pulses comprises only two or three pulses.

3. (original) The method according to Claim 1 wherein said wire is selected from a group consisting of gold, copper, silver, alloys thereof, plated materials, and insulated metal wires.

4. (original) The method according to Claim 1 wherein said wire is selected from a group consisting of wire diameters in the range from about 15 to 75 µm for gold and about 25 to 75 µm for copper.

5. (original) The method according to Claim 1 wherein said wire melting and ball forming is performed in ambient air.

6. (original) The method according to Claim 1 wherein said train of EFO current pulses is further controlled to reduce size and damage in the heat-affected zone, thereby providing smooth wire loop formation.

7. (original) The method according to Claim 1 wherein said train of EFO current pulses provides a continuous series of pulses of progressively lower heights, yet various pulse widths.

8. (original) The method according to Claim 7 wherein said pulse train of progressively lower heights minimizes the heat affected zone of the wire.

9. (original) The method according to Claim 1 wherein said train of EFO current pulses provides a series of pulses alternating between high and low heights and various widths.

10. (original) The method according to Claim 9 wherein said low pulse height is configured to prevent overheating of the free air ball and wire necking while maintaining the EFO arc.

11. (currently amended) The method according to Claim 1 wherein said automatic pulse train calculation is provided by pre-determined empirical data stored in ~~the master file of~~ said computerized bonder.

12. (new) A method of forming a ball at the end of a wire, comprising the step of:

exposing the end of the wire to a plurality of current pulses, wherein each pulse in said plurality has a lower magnitude than the preceding pulse.

13. (new) The method of Claim 12 wherein the plurality of current pulses comprises three pulses, wherein the first of the three pulses is of a first duration, the second of the three pulses is of a second duration, the second duration being shorter than the first duration, and the third of the three pulses is of a third duration, the third duration being longer than the first and second durations.

14. (new) The method of Claim 12 wherein the last pulse in said plurality is of a magnitude that is about half the magnitude of the first pulse in said plurality.

15. (new) The method of Claim 12 wherein the duration of the last pulse in said plurality is over twice as long as the duration of the first pulse in said plurality.

16. (new) A method of forming a ball at the end of a wire, comprising the steps of:

exposing the end of the wire to a first current pulse;

exposing the end of the wire to a second current pulse, wherein the second pulse is of lesser magnitude than the first pulse; and

exposing the end of the wire to a third current pulse, wherein the third pulse is of a magnitude between the magnitudes of the first and second pulses.

17. (new) The method of Claim 16 wherein the first of the three pulses is of a first duration, the second of the three pulses is of a second duration, the second duration being shorter than the first duration, and the third of the three pulses is of a third duration, the third duration being longer than the first and second durations.

18. (new) The method of Claim 16 wherein the third current pulse is of a magnitude that is about half the magnitude of the first current pulse.

19. (new) The method of Claim 16 wherein the duration of the third current pulse is over twice as long as the duration of the first current pulse.